

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 0 884 060 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
16.12.1998 Bulletin 1998/51

(51) Int Cl.⁶: **A61M 16/04**

(21) Application number: **98303605.4**

(22) Date of filing: **08.05.1998**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

(71) Applicant: **Smiths Industries Public Limited
Company**
London, NW11 8DS (GB)

(72) Inventor: **Pagan, Eric**
Hythe, Kent, CT21 6DA (GB)

(74) Representative: **Flint, Jonathan McNeill et al**
765 Finchley Road
London NW11 8DS (GB)

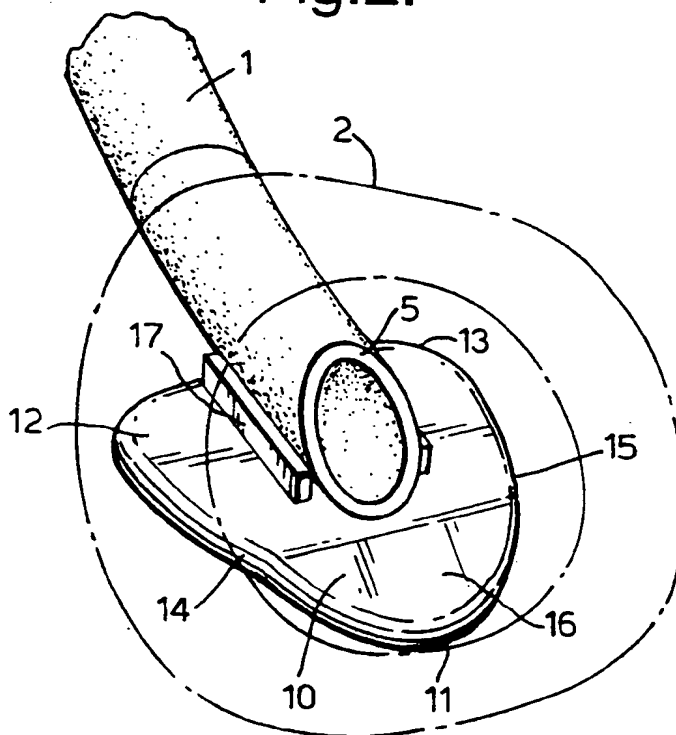
(30) Priority: **22.05.1997 GB 9710645**

(54) Cuffed tube assemblies

(57) An endotracheal tube 1 has an inflatable cuff 2 at its patient end enclosing a plate 10 of generally trian-

gular shape projecting forwardly of the patient end of the tube. When deflated, the cuff 2 conforms to the external shape of the plate 10.

Fig.2.



Description

This invention relates to cuffed tubes assemblies of the kind including a tubular member and a cuff.

Various cuffed tubes have an inflatable cuff at their patient end that is deflated for introduction to a body cavity. In some tubes, such as endotracheal tubes, the deflated cuff preferably presents as low a profile as possible. In other tube assemblies, such as laryngeal or pharyngeal mask airways, the cuff preferably has a particular shape when deflated that helps locate the assembly correctly. In such assemblies, the cuff is usually attached to one side of a plate, or the like, of the desired shape. However, because the desired shape of the cuff when inflated is different from that when deflated, this can be difficult to arrange.

It is an object of the present invention to provide an improved cuffed tube assembly.

According to the present invention there is provided a cuffed tube assembly of the above-specified kind, characterised in that the assembly includes a plate projecting outwardly of the tubular member towards its patient end, and that the cuff surrounds the plate and substantially conforming to the external shape of the plate when deflated.

The cuff may be inflatable beyond the patient end of the tubular member, the plate projecting beyond the patient end of the tubular member. The plate may be of generally triangular shape and may be inclined away from the axis of the tubular member where it projects beyond the patient end of the tubular member. Alternatively, the tubular member may open through at least one aperture in its wall, the cuff having a side opening through which the aperture in the tubular member opens. The patient end of the tubular member may project beyond the patient end of the cuff. The plate may comprise two wings extending longitudinally on opposite sides of the tubular member in the region of the aperture. The wings may be formed on a component a part of which is inserted within the patient end of the tubular member, which preferably has an inclined surface directed towards the aperture.

Three different forms of cuffed tube assembly according to the present invention, will now be described, by way of example, with reference to the accompanying drawings, in which:

- Figure 1 is a side elevation view of a pharyngeal mask assembly;
- Figure 2 is a perspective view of the patient end of the assembly of Figure 1;
- Figure 3 is a side elevation view of a part of the assembly;
- Figure 4 is a side elevation view of an alternative pharyngeal mask assembly;

Figure 5 is a perspective view of the assembly of Figure 4 without a cuff;

Figure 6 is a lateral cross section along the line VI-VI of Figure 5;

Figure 7 is a side elevation view of another alternative assembly without a cuff; and

Figure 8 is a plan view of a part of the alternative assembly of Figure 7.

With reference first to Figures 1 to 3, there is shown a pharyngeal mask assembly having a curved tube 1 with an inflatable cuff 2 at its patient end. The rear end 3 of the cuff 2 is attached to the outside of the tube, the forward end 4 being attached to the forward, bevelled end 5 of the tube. An inflation aperture 6 on the outside of the tube 1 opens within the cuff 2 and communicates with an inflation line 7 via a lumen extending within the wall of the tube. When inflated, as shown, the cuff 2 expands forwardly beyond the forward end of the tube and forms an angled end face 8 with a central opening 9 into the tube, the end face being arranged to seal with tissue around the patient's laryngeal opening. As so far described, the tube is conventional and may be similar to that described in EP-A-712638. The assembly, however, differs from previous assemblies in that a plastics plate member 10 projects radially outwardly from the tube 1, within the cuff 2. The plate member 10 is of approximately triangular shape with rounded corners 11 to 13 and with two sides 14 and 15 curved slightly outwardly. The plate 10 is attached to the longer side of the tube 1, with the bevelled tip of the tube being set back from the forward apex 11 of the plate 10 by a distance about one third the length of the plate. That part 16 of the plate 10 projecting forwardly beyond the end of the tube 1 is inclined down away from the axis of the tube by about 30° (Fig 3). The plate 10 has two, parallel low walls 17 projecting from its upper surface rearwardly of the forward part 16, which serve to locate the tube 1 centrally of the plate, so that the sides of the plate project outwardly as two lateral wings.

The cuff 2 is attached to the tube 1 at one end 3 to the rear of the plate 10. The other end 4 of the cuff is attached to the bevelled end surface 5 of the tube 1, so that it encloses the plate 10 and is not attached to it. When the cuff 2 is inflated by air supplied to the inflation line 7, the cuff expands to the shape shown, beyond the boundaries of the plate 10. For insertion and removal of the assembly from the patient, the cuff 2 is deflated by sucking air from the inflation line 7, which has the effect of drawing the wall of the cuff down onto the outside of the tube and onto the upper and lower surfaces of the plate 10. The shape of the plate 10 is chosen so that it helps locate the forward end of the tube 1 in the correct position prior to inflation of the cuff 2 and maintains the deflated cuff in the correct position to ensure that it in-

flates correctly to the desired shape.

With reference now to Figures 4 to 6, there is shown an alternative pharyngeal mask assembly 20 having a tube 21, which is closed at its patient end 22 and opens through a number of holes 23 in its side wall spaced a short distance rearwardly of the patient end. The mask assembly 20 has a cuff 25 of generally tubular shape. The forward end 26 of the cuff 25 is attached to the outside of the tube 21 at a location forwardly of the holes 23, the rear end 27 being attached to the tube rearwardly of the holes. The cuff 25 has a side opening 28 the edge of which is also attached to the outside of the tube 21 around the region of the holes 23, so that the holes are exposed externally through the side opening of the cuff. As so far described, this assembly is conventional, such as described in EP-A-712638. The assembly differs from previous assemblies in that the tube 21 has a plate member 29 projecting radially outwardly at the patient end of the tube on opposite sides of the region with the holes 23. The plate 29 takes the form of two narrow wings 30 with tapered ends and extending longitudinally and projecting radially outwardly. The plate 29 may be formed in various ways. For example, it could be formed as a separate component or components and subsequently attached to the tube. Alternatively, it could be heat formed from the wall of the tube. Another way of forming the plate would be to extrude the tube with two laterally-projecting wings, so that they extend along the entire length of the tube, and then cut away parts of the wings to leave the desired shape.

In use, the assembly shown in Figures 4 to 6 is inserted with the cuff 25 deflated so that the patient end 22 of the tube is located in the lower pharynx, behind the laryngeal opening, and the opening 28 in the cuff is located at the laryngeal inlet. The cuff 25 is then inflated to seal in the pharyngeal region.

Figures 7 and 8 illustrate an alternative way of forming the assembly shown in Figure 4. In this arrangement, the plate 29' is formed on a separate butterfly-shape component 31 shown in Figure 8. The plate 29' is provided by two wing members 32 of triangular shape extending rearwardly from a nose portion 33. The nose portion 33 has a tapered, rounded tip 34 and a rearwardly-extending spigot 35. The nose portion 33 is inclined down at an angle of about 20° from the axis of the spigot 35. The shape of the spigot 35 is such that it forms a push fit inside the forward end of the tube 21' and has a profiled upper surface to divert a suction catheter (not shown) inserted along the assembly upwardly so that it passes out through the holes 23'. This assembly has the advantage that the spigot 35 reduces deadspace at the patient end of the tube 21'.

the assembly includes a plate (10, 29, 29') projecting outwardly of the tubular member (1, 21, 21') towards its patient end, and that the cuff (2, 25) surrounds the plate (10, 29, 29') and substantially conforms to the external shape of the plate when deflated.

2. An assembly according to Claim 1, characterised in that the cuff (2) is inflatable beyond the patient end of the tubular member (1), and that the plate (10) projects beyond the patient end of the tubular member (1).
3. An assembly according to Claim 2, characterised in that the plate (10) is of generally triangular shape.
4. An assembly according to Claim 2 or 3, characterised in that the plate (10) is inclined away from the axis of the tubular member (1) where it projects beyond the patient end of the tubular member (1).
5. An assembly according to Claim 1, characterised in that the tubular member (21, 21') opens through at least one aperture (23, 23') in its wall, and that the cuff (25) has a side opening (28) through which the aperture in the tubular member opens.
6. An assembly according to Claim 5, characterised in that the patient end of the tubular member (21, 21') projects beyond the patient end of the cuff (25).
7. An assembly according to Claim 5 or 6, characterised in that the plate (29, 29') comprises two wings (30, 32) extending longitudinally on opposite sides of the tubular member (21, 21') in the region of the aperture (23, 23').
8. An assembly according to any one of Claim 7, characterised in that the wings (32) are formed on a component (31) a part (35) of which is inserted within the patient end of the tubular member (21').
9. An assembly according to Claim 8, characterised in that the part (35) of the component (31) inserted in the tubular member (21') has an inclined surface (36) directed towards the aperture (23').

Claims

1. A cuffed tube assembly including a tubular member (1, 21, 21') and a cuff (2, 25), characterised in that

Fig.1.

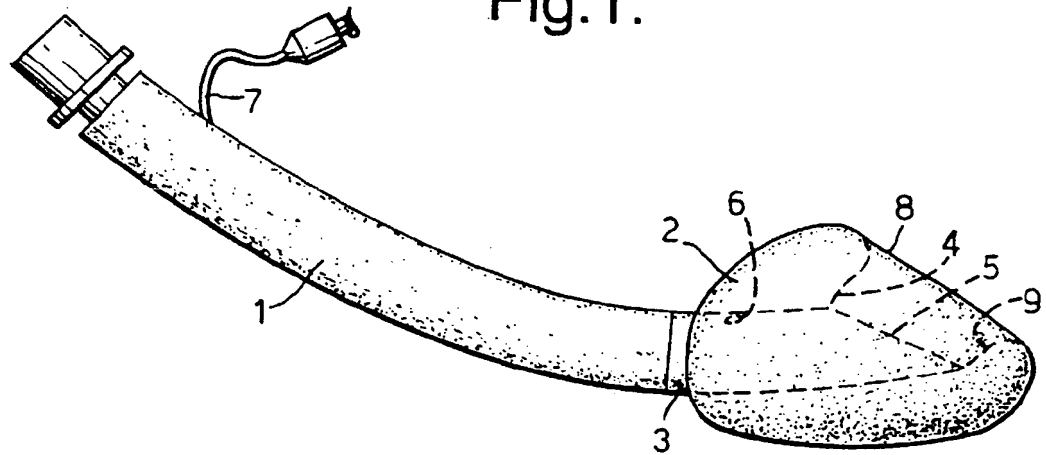


Fig.3.

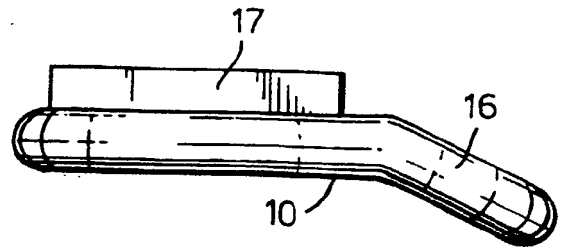


Fig.2.

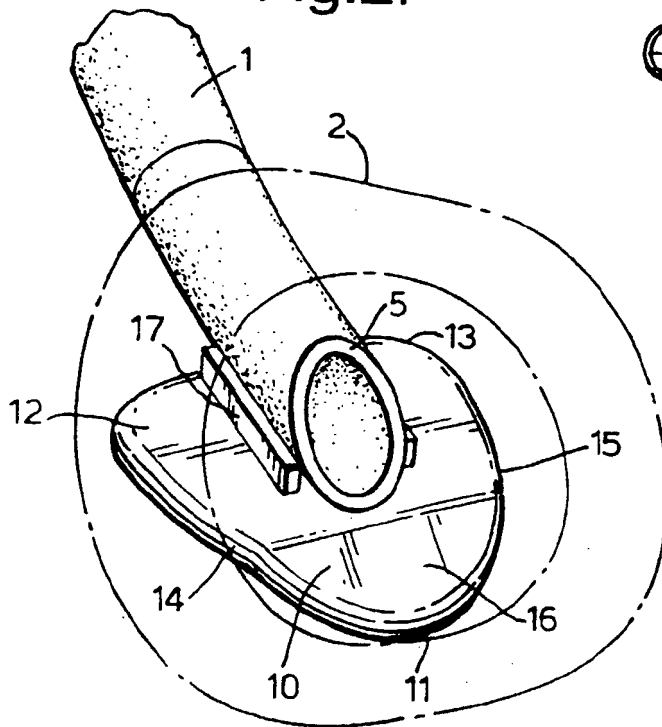


Fig.4.

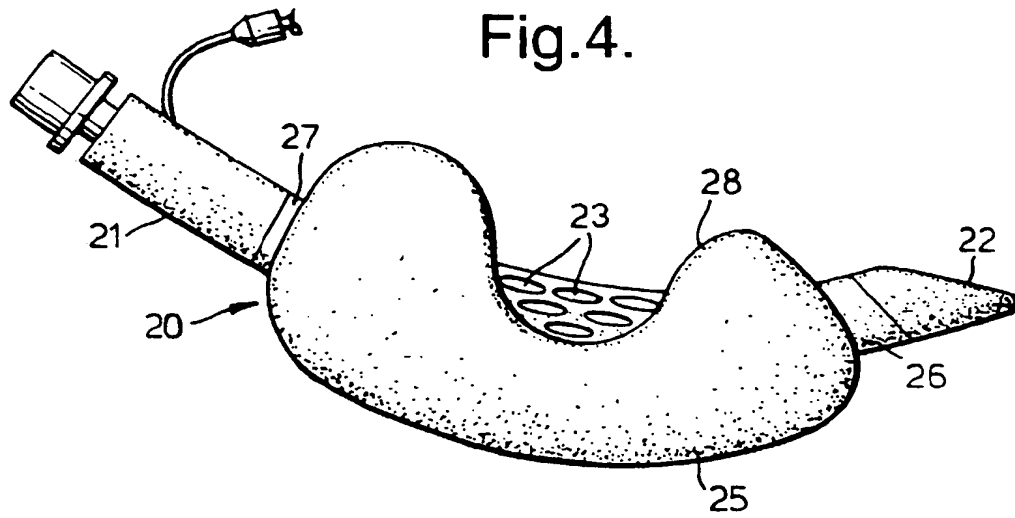


Fig.5.

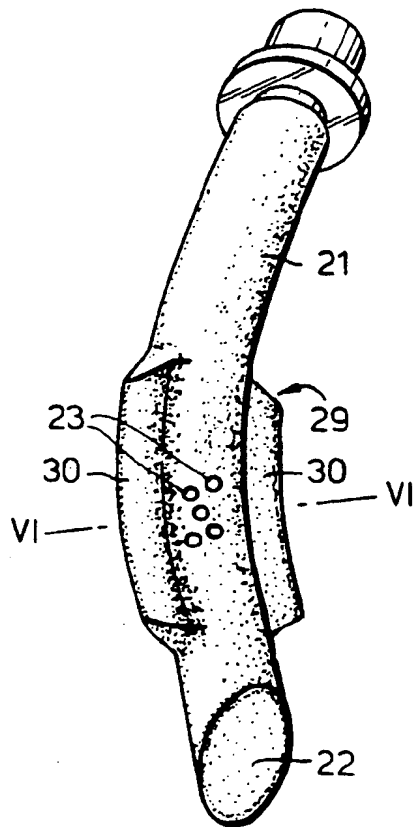


Fig.6.

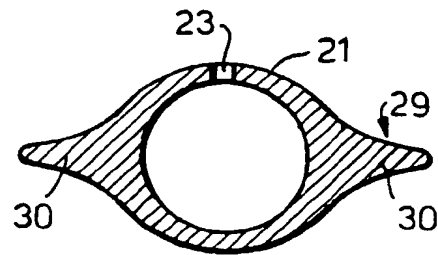


Fig.7.

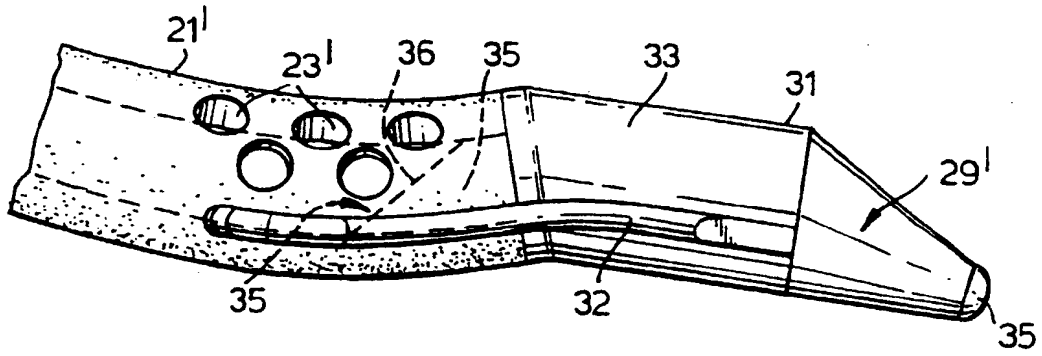
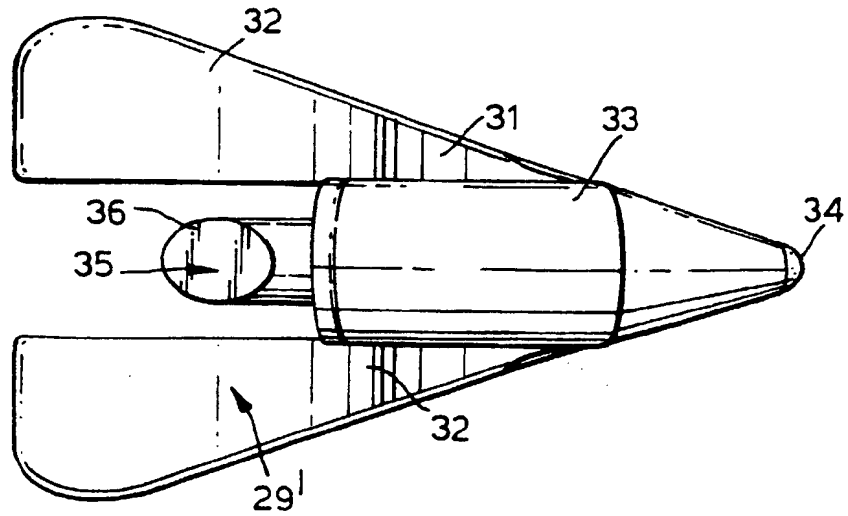


Fig.8.



(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 884 060 A3

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
21.04.1999 Bulletin 1999/16

(51) Int Cl.⁶: **A61M 16/04**

(43) Date of publication A2:
16.12.1998 Bulletin 1998/51

(21) Application number: **98303605.4**

(22) Date of filing: **08.05.1998**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

(71) Applicant: **Smiths Industries Public Limited
Company**
London, NW11 8DS (GB)

(72) Inventor: **Pagan, Eric**
Hythe, Kent, CT21 6DA (GB)

(30) Priority: **22.05.1997 GB 9710645**

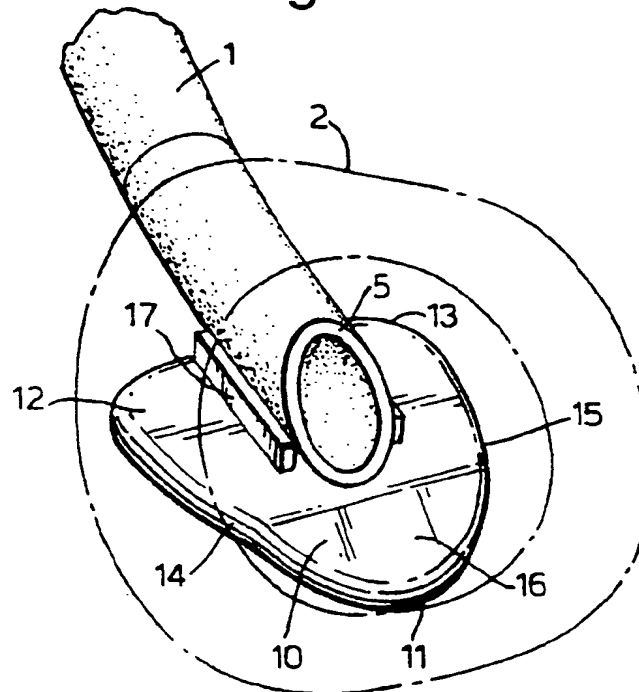
(74) Representative: **Flint, Jonathan McNeill et al**
765 Finchley Road
London NW11 8DS (GB)

(54) **Cuffed tube assemblies**

(57) An endotracheal tube 1 has an inflatable cuff 2 at its patient end enclosing a plate 10 of generally trian-

gular shape projecting forwardly of the patient end of the tube. When deflated, the cuff 2 conforms to the external shape of the plate 10.

Fig.2.



EP 0 884 060 A3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 30 3605

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	WO 96 40340 A (AUGUSTINE MEDICAL INC) 19 December 1996 * page 3, line 28 - page 4, line 10 * * page 12, line 20 - line 27; figure 4 *	1	A61M16/04
X	US 5 355 879 A (BRAIN ARCHIBALD I J) 18 October 1994 * column 2, line 59 - line 63; claim 1; figures 2,3 *	1-4	
A,D	EP 0 712 638 A (MALLINCKRODT MEDICAL INC) 22 May 1996 * column 5, line 56 - column 6, line 12; claim 1; figure 1 * * column 11, line 1 - line 11; figure 9 *	1,2,5,6	
A	US 4 230 108 A (YOUNG SHARON L) 28 October 1980 * column 2, line 12 - line 40; figure 1 *	1,5,6	
E	DE 198 10 476 A (SMITHS IND PUBLIC LTD) 24 September 1998 * column 1, line 54 - line 60 * * column 2, line 4 - line 22; figure 2 *	1,2,4	TECHNICAL FIELDS SEARCHED (Int.Cl.6) A61M
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 2 March 1999	Examiner Lakkis, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 (3/82) (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 30 3605

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-03-1999

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9640340	A	19-12-1996	US 5638813 A	17-06-1997
			AU 5883096 A	30-12-1996
			CA 2214714 A	19-12-1996
US 5355879	A	18-10-1994	US 5241956 A	07-09-1993
			CA 2107027 A,C	29-03-1994
			AU 3958293 A	29-08-1994
			CA 2155112 A	18-08-1994
			WO 9417848 A	18-08-1994
			MX 9301163 A	29-07-1994
			US 5391248 A	21-02-1995
			AT 151650 T	15-05-1997
			AU 666756 B	22-02-1996
			AU 4580393 A	14-02-1994
			BR 9306757 A	08-12-1998
			CA 2100998 A,C	24-01-1994
			DE 69309930 D	22-05-1997
			DE 69309930 T	23-10-1997
			DK 651664 T	20-10-1997
			EP 0651664 A	10-05-1995
			ES 2103481 T	16-09-1997
			WO 9402191 A	03-02-1994
			GR 3023983 T	31-10-1997
			JP 7509154 T	12-10-1995
			NZ 254213 A	27-02-1996
EP 0712638	A	22-05-1996	JP 7323088 A	12-12-1995
			AU 700088 B	24-12-1998
			AU 2538795 A	21-12-1995
			US 5743258 A	28-04-1998
			CA 2168548 A	07-12-1995
			WO 9532754 A	07-12-1995
US 4230108	A	28-10-1980	NONE	
DE 19810476	A	24-09-1998	DE 19810477 A	24-09-1998
			GB 2323291 A	23-09-1998
			GB 2323292 A	23-09-1998
			JP 10263084 A	06-10-1998
			JP 10263085 A	06-10-1998

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

THIS PAGE BLANK (cont.)

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.

THIS PAGE BLANK (USPTO)